

REBUTTAL TESTIMONY

OF

DR. KENNETH PETRUNIK

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2017-370-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION.

A. My name is Dr. Kenneth “Ken” Petrunik. My business address is 2183 Shawanaga Trail, Mississauga, Ontario. I am a consultant in the nuclear power industry with a range of international clients and currently am a non-executive board member of Horizon Nuclear Power in the U.K.

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE.

A. I grew up in Sault Ste. Marie, Ontario, and have a Ph.D. in Chemical Engineering from the University of Windsor in Canada. I have worked in the nuclear power industry since completing my Ph.D. in 1973 and have nearly 45 years of experience in nuclear power and nuclear power plant construction. From 2009 to 2014, I served as Chief Program Officer for Emirates Nuclear Energy Corporation (ENEC) and led oversight of Korea Electric Power Corporation’s construction and delivery of four APR 1400 nuclear power plants built in the United Arab Emirates. Prior to that,

1 beginning in 1974, I worked for Atomic Energy of Canada, Limited
2 (AECL) in a variety of positions and ultimately served as Chief Operating
3 Officer and also President of the CANDU Reactor Division. In that role, I
4 was responsible for AECL's commercial CANDU nuclear reactor business
5 including marketing and delivery of new-build nuclear reactors and services
6 to nuclear operating stations. During my time with CANDU Reactor
7 Division, I began as a design engineer and before becoming COO and
8 President of AECL CANDU. I worked on all of AECL's CANDU new
9 build projects namely Darlington, Bruce, Pickering, Lepreau and Gentilly
10 in Canada and internationally Embalse, Argentina; Cernavoda, Romania;
11 Wolsong, Korea; and Qinshan, China. As COO and President of AECL
12 CANDU, I was ultimately responsible for the overall commercial business
13 of the enterprise.

14 **Q. DESCRIBE ANY ADDITIONAL PROFESSIONAL**
15 **CERTIFICATIONS OR DISTINCTIONS YOU POSSESS THAT**
16 **SUPPORT YOUR TESTIMONY.**

17 A. Before leaving Canada in 2009, I was a Registered Professional
18 Engineer in the Province of Ontario, Canada and a Fellow of the Canadian
19 Academy of Engineering, a group of Canadian engineers and related
20 professionals elected based on their distinguished service and contribution
21 to society, to Canada and to the engineering profession. I was also a
22 member of the Canadian Nuclear Society and the Canadian Nuclear

1 Association where I received a leadership award from the Canadian
2 Nuclear Association for the successful completion of the Qinshan Nuclear
3 Power Plant in China. In addition, I received the K. Y. Lo medal from the
4 Engineering Institute of Canada for contributions to international
5 engineering and the Friendship Award from the Chinese government for
6 technical support to China. The Friendship Award is the highest award
7 given by the Chinese government to a foreign expert.

8 **Q. HAVE YOU EVER TESTIFIED BEFORE THE PUBLIC SERVICE**
9 **COMMISSION OF SOUTH CAROLINA (“COMMISSION”)**
10 **BEFORE?**

11 A. Yes, I have filed testimony in Docket Nos. 2017-207-E and 2017-
12 305-E (my “Prior Testimony”) before the Public Service Commission of
13 South Carolina (the “Commission”).

14 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

15 A. The primary purpose of my testimony is to address the direct
16 testimony of Gary C. Jones, Scott J. Rubin and Anthony James. I will also
17 provide the Commission with my conclusions regarding the prudence of
18 SCE&G’s oversight of the construction of the Summer Nuclear Units 2 and
19 3 (the “Units”) located in Jenkinsville, South Carolina (the “Project”) and
20 the sufficiency of SCE&G’s many disclosures to the Office of Regulatory
21 Staff (ORS) and the Commission.

1 **Q. WHAT INFORMATION HAVE YOU REVIEWED REGARDING**
2 **THE PROJECT?**

3 A. I have read and analyzed the key reports and documents related to
4 the Project, including, but not limited to, SCE&G Quarterly Reports to the
5 Commission, Monthly Reports from Westinghouse (“WEC”) and its
6 consortium partner for the Project, first the Shaw Group and later Chicago
7 Bridge and Iron (CB&I), monthly reports prepared by SCE&G’s new
8 nuclear development (“NND”) team, direct testimony of SCE&G witnesses
9 in proceedings before the Commission related to the Project, direct
10 testimony of ORS witnesses in such proceedings, the resulting Commission
11 orders, legislative reports made by ORS, other documents issued by ORS,
12 and various documents related to or prepared by the Bechtel Corporation.
13 In addition, I have interviewed SCE&G employees and I have visited the
14 Project site. A partial list of the documents I have reviewed is attached as
15 *Exhibit___, (KP-1).*

16 **Q. HAVE YOU READ AND ANALYZED THE BECHTEL REPORT(S)?**

17 A. Yes, I have read the Preliminary Results of Bechtel Assessment
18 dated October 22, 2015 (the “Bechtel Presentation”), the Project
19 Assessment Reports dated November 9, 2015 and November 12, 2015 and
20 marked “DRAFT” (the “Draft Bechtel Reports”), the Project Assessment
21 Report dated February 5, 2016 (the “Bechtel Report”) and the Schedule

1 Assessment Report dated February 5, 2016 (“Bechtel Assessment” and
2 collectively the “Bechtel Reports”).

3 **Q. HAVE YOU READ ANTHONY JAMES’ DIRECT TESTIMONY?**

4 A Yes, I have read Anthony James’ direct testimony.

5 **Q. HAVE YOU READ GARY C. JONES’ DIRECT TESTIMONY?**

6 A Yes, I have read Gary C. Jones’ direct testimony.

7 **Q. HAVE YOU READ SCOTT J. RUBIN’S DIRECT TESTIMONY?**

8 A Yes, I have read Scott J. Rubin’s direct testimony.

9 **Q. WHAT IS THE SUBSTANCE OF THAT TESTIMONY THAT YOU**
10 **ARE RESPONDING TO?**

11 A. Mr. James, Mr. Jones and Mr. Rubin raise many issues unrelated to
12 my analysis that will be addressed by other witnesses. I intend to respond to
13 their contentions regarding SCE&G’s retention of Bechtel, SCE&G’s
14 disclosure of Bechtel’s retention, recommendations and schedule estimates,
15 and SCE&G’s oversight and management of the Project. More specifically,
16 I will address contentions from Mr. James and Mr. Jones regarding
17 SCE&G’s alleged failure to disclose Bechtel’s retention, and my view that
18 the estimated substantial completion dates (“SCDs”) arrived at by Bechtel
19 amount to opportunistic overreach. I will also address Mr. James’ assertion
20 that SCE&G utilized a “hands-off” management style which was imprudent
21 and Mr. Jones’ contention - with the benefit of 20/20 hindsight - that the
22 schedules provided to ORS and throughout the project were insufficient and

1 demonstrate imprudent management of the Project. Finally, I will address
2 Mr. Rubin's contention that a prudent owner would have abandoned the
3 Project in 2013 or 2014.

4 **Q. DO MR. JONES AND MR. JAMES PROVIDE AN ACCURATE**
5 **ACCOUNT OF THE HOW THE PROJECT PROCEEDED?**

6 A. No they do not. They provide a skewed account of the Project with
7 selective hindsight instead. Hindsight can be helpful, but the Project and
8 decision making proceeded in real time and must be evaluated with that in
9 mind.

10 **Q. HOW DO YOU RESPOND TO THE POINTS MADE BY MR.**
11 **JAMES' AND MR. JONES' CONTENTIONS REGARDING**
12 **BECHTEL IN THEIR TESTIMONY?**

13 A. In my Prior Testimony, I outline in detail why ORS had both the
14 information and expertise necessary to understand where the project stood
15 and the risks that WEC faced in meeting its schedule and cost
16 commitments. Mr. Jones' testimony in the 2015 and 2016 update docket
17 clearly show that this was the case. ORS understood as well as anyone
18 could what the risks and dangers were (and which SCE&G disclosed).
19 ORS possessed sufficient information for ORS to understand the magnitude
20 of the Project's issues and challenges that led to the retention of Bechtel.
21 Mr. James and Mr. Jones are simply incorrect when they assert SCE&G
22 withheld material information from the Commission and ORS and that it

1 was imprudent not to disclose the retention of Bechtel or Bechtel's limited
2 findings and conclusions or that disclosure of them would have changed the
3 overall assessment of the value of continuing the Project. The reports and
4 other documents that were made available to ORS contained all of the
5 material information that someone familiar with nuclear construction,
6 specifically ORS's construction experts, would need to understand the
7 status, schedule and challenges of the Project.

8 While the Bechtel Reports may have contained a limited number of
9 reasonable and useful suggestions for improving the efficiency of the
10 Project, those suggestions are made in response to challenges and problems
11 that were well known and clearly identified in other documents. The
12 Bechtel Reports did not identify any undisclosed issues or challenges. The
13 issues and challenges discussed in the Bechtel Reports were the same issues
14 and challenges that had been discussed and disclosed in numerous reports
15 and other documents provided to ORS. The Bechtel Reports did not
16 provide any material information about those issues and challenges that was
17 not disclosed in other documents and well known to those following the
18 Project.

19 The documentary record shows that ORS, as the state regulatory
20 agency charged with direct oversight in these matters, had all the
21 information necessary to understand where the Project stood and the
22 challenges it faced without reference to the Bechtel Reports.

1 In addition, as I explain below and in my Prior Testimony, the
2 construction schedule contained in the Bechtel Presentation and Draft
3 Bechtel Reports and Bechtel Assessment was based on inadequate
4 information, did not reflect key Project data and was properly excluded
5 from the final Bechtel Report.

6 **Q. WHAT IS YOUR UNDERSTANDING OF THE ROLE OF ORS IN**
7 **PROTECTING THE PUBLIC INTEREST RELATED TO THIS**
8 **CONSTRUCTION?**

9 A. As indicated above and in my Prior Testimony, it is my
10 understanding that ORS represented the public interest in these matters and
11 reported its conclusions about the Project to the Commission and the
12 public. It did so through the quarterly reports that it issued on the Project,
13 the testimony and reports it provided in proceedings before the Commission
14 over the course of the Project, the settlement agreements it adopted and
15 other reports and public statements. I have reviewed a number of ORS's
16 reports, documents and public statements related to the Project. They show
17 that ORS understood the challenges faced by the Project very well. I do not
18 see any relevant and material facts discussed in the Bechtel Reports that
19 ORS did not understand or failed to acknowledge in its reports and public
20 statements.

1 **Q. WHAT DO YOU CONCLUDE BASED ON YOUR REVIEW OF THE**
2 **INFORMATION PROVIDED TO ORS CONCERNING SCE&G's**
3 **DISCLOSURE OF THE PROJECT STATUS?**

4 A. I have reviewed the monthly construction reports issued by
5 WEC/CB&I and SCE&G, as well as other construction reports and, the
6 quarterly reports that were prepared and filed with ORS and the
7 Commission and made available to the public.

8 The monthly construction reports that ORS reviewed are standard
9 and typical reports used in managing projects of this sort. The monthly
10 reports for this Project were quite comprehensive and very detailed. They
11 included information concerning milestones, delays, problems, schedule
12 issues, inspections, and critical paths. They often ran over 100 pages in
13 length and included a great deal of supporting documentation. They were
14 the basis on which monthly project review meetings were conducted on site
15 and the individuals who contributed to them were questioned about what
16 they reflected.

17 To anyone reasonably experienced in nuclear construction, these
18 reports communicated a clear picture of where the Project stood month-to-
19 month and quarter-to-quarter. They clearly communicated the challenges
20 being faced by the Project and the difficulties the Project was encountering
21 in meeting the substantial completion date commitments which
22 WEC/CB&I made.

1 In addition, SCE&G also produced quarterly reports specifically for
2 ORS which summarized and expanded on the material provided in the
3 monthly reports. These in turn were supplemented by annual construction
4 updates conducted either in formal hearings before the Commission or in
5 allowable ex parte information briefings.

6 I have reviewed all these documents and they clearly indicate that
7 ORS had all the information needed to understand where the Project stood
8 and what challenges it faced, specifically as to the completion schedule, but
9 also concerning the other important challenges involved. The Bechtel
10 Reports did not include material information that was not otherwise
11 disclosed to ORS.

12 **Q. IN YOUR OPINION DID SCE&G ENGAGE IN A GOOD FAITH**
13 **EFFORT TO PROVIDE ORS AND THE PSC WITH AN**
14 **ACCURATE CONSTRUCTION SCHEDULE PRIOR TO MARCH**
15 **2015?**

16 A. Yes, the schedule in question was fully integrated, allowing for
17 activities of engineering, procurement and modular fabrication portions of
18 the project to interface with the site construction and startup portions of the
19 project schedules. SCE&G had spent over a year pressuring the
20 Consortium to produce it and months reviewing, challenging and revising
21 the schedule and its assumptions with the Consortium. Per the EPC
22 Contract, the Consortium had the right to choose its means and methods of

1 planning and constructing the Project. The Consortium had a fully
2 integrated schedule database, and it also maintained a separate, but
3 corresponding database that contained the estimated unit rates, resources
4 and costs. The documents show that the Consortium presented information
5 from both of these databases in the third quarter of 2014 and the SCE&G
6 team spent the subsequent months reviewing the data. The documents
7 show that SCE&G had throughout the course of the Project pressed for
8 better and more comprehensive schedules. In addition, Mr. Jones and ORS
9 were fully aware of these facts as they developed. ORS's testimony in past
10 proceedings and other public statements show that to be the case. I note
11 several comments regarding the need for resource loaded schedules by Mr.
12 Jones. I have not used resource loaded schedules in my nuclear new build
13 experience, which includes completion of multiple nuclear power plants.

14 **Q. IN YOUR OPINION WAS ORS IN A POSITION TO UNDERSTAND**
15 **THE INFORMATION THAT WAS PROVIDED TO IT ABOUT THE**
16 **PROJECT?**

17 A. Absolutely. ORS also had at its disposal the expert advice necessary
18 to review and understand the information provided and to interpret it for
19 ORS and the public. Specifically, ORS was advised in these matters by Mr.
20 Gary Jones whose resume shows him to have sufficient training and
21 practical experience in nuclear construction to understand the information
22 provided, which was extensive. Mr. Jones' work was supplemented by

1 ORS employees assigned to this Project who also had experience in
2 technical and construction matters.

3 **Q. DO ORS'S PUBLIC STATEMENTS SHOW THAT ORS IN FACT**
4 **UNDERSTOOD THE SCHEDULE CHALLENGES FACED BY THE**
5 **PROJECT?**

6 A. Yes. As discussed in my Prior Testimony, the record clearly shows
7 that ORS understood the schedule challenges faced by the Project and was
8 in no way misled by any alleged withholding of information. ORS fully
9 understood the risks and challenges encountered during the Project and was
10 not in any way kept in the dark by non-disclosures. Mr. Jones' testimony in
11 prior dockets and the statements ORS has made publicly are very clear.
12 ORS was not in any way ignorant or misled about the status of the Project.
13 In the quarterly reports, the monthly construction reports, and the other
14 information that SCE&G provided, ORS and its experts had the
15 information they needed to understand the schedule concerns faced by the
16 Project. And they did understand those concerns.

17 **Q. CAN YOU PROVIDE EXAMPLES OF SCE&G'S PRIOR**
18 **DISCLOSURE TO THE COMMISSION AND ORS OF THE ISSUES**
19 **DISCUSSED IN THE BECHTEL REPORTS?**

20 A. Yes. Attached to my testimony as *Exhibit* __, (KP-2) is a
21 compilation of specific instances of disclosures that are found in the
22 reports, testimony, and other public disclosures associated with the Project.

1 This compilation organizes those statements and disclosures around the key
2 challenges identified in the Bechtel Reports.

3 This compilation is an expanded and revised version of a
4 compilation assembled by SCE&G and previously filed in Docket No.
5 2017-305-E in support of a motion to dismiss the petition in this matter
6 filed by SCE&G. My version of this compilation includes citations to
7 additional documents which have been produced during discovery and goes
8 beyond what was submitted earlier. It shows that each of the major
9 challenges to the Project that were discussed in the Bechtel Reports were
10 fully understood by ORS and disclosed to the public. As mentioned above
11 there is no failure of disclosure related to this Project.

12 The source documents on which *Exhibit* ____, (*KP-2*) is based are
13 filed with the Commission and attached to my prior testimony as *Exhibit*
14 ____, (*KP-3*). They include hearing and ex parte informational briefing
15 transcripts, quarterly reports filed by SCE&G, quarterly reports filed by
16 ORS, monthly reports by ORS to the General Assembly of the State of
17 South Carolina, presentations made by ORS to the South Carolina Energy
18 Users Committee and in one case, the notes of a presentation by ORS to the
19 General Assembly made on November 29, 2016. These ORS reports and
20 other documents were provided directly by ORS or in response to discovery
21 requests in this matter or filed by ORS in Docket No. 2008-196-E.

1 **Q. HAVE YOU READ AND ANALYZED THE PROFESSIONAL**
2 **SERVICES AGREEMENT UNDER WHICH BECHTEL**
3 **CONDUCTED ITS REVIEW?**

4 A. Yes. I have.

5 **Q. FOR WHAT PURPOSE WAS BECHTEL HIRED AND BY WHOM?**

6 A Bechtel was hired by the law firm of Smith, Currie & Hancock LLP,
7 which represented SCE&G and Santee Cooper, to assist those lawyers and
8 the project owners “in better understanding the current status and potential
9 challenges of the Project in anticipation of litigation and to ensure the
10 Project is on the most cost-efficient trajectory to completion.” Bechtel’s
11 work was specifically intended to be directed by an attorney from Smith
12 Currie & Hancock. The scope of work was set forth in detail in that
13 document. As Mr. Addison and Mr. Kochems testified at the time, there
14 were escalating payment and other disputes that seemed to be leading
15 toward litigation or other forms of legal dispute resolution.

16 Bechtel was asked to conduct a review of the owner’s organizational
17 charts and structure, the Consortium’s organizational charts, the monthly
18 construction progress reports, the milestone management schedules, the
19 integrated engineering, procurement and construction schedules, cost and
20 schedule forecasts, staffing projections, supply chain and module
21 fabrication information and other documents. Bechtel was to supplement

1 this documentary review with meetings with key Consortium personnel,
2 site walk downs and interviews with the owners' leadership team.

3 **Q. DID YOU FIND ANY MATERIAL INFORMATION IN THE**
4 **BECHTEL REPORTS THAT HAD NOT BEEN OTHERWISE**
5 **DISCLOSED?**

6 A. No. I found no material undisclosed information or other surprises in
7 the Bechtel Reports. The issues raised in the Bechtel Reports had been
8 acknowledged and described in detail in quarterly reports to ORS, the
9 monthly construction reports and other material made available to ORS,
10 and in the testimony and other filings before the Commission.

11 Furthermore, as a general matter, the problems that were identified
12 in the Bechtel Reports were generally known in the nuclear construction
13 industry to be problems faced by the two U.S. AP1000 projects. At the
14 time, members of the industry, myself included, were well aware of the
15 nature of these problems, including the project delays.

16 In addition, I also did some review work for WEC in the setting up
17 of the Moorside AP1000 project in the UK and on the WEC bid to
18 construct multiple AP1000 units in India. I was aware of challenges in the
19 existing AP1000 projects because they were a matter of concern and of
20 great importance for WEC and its business. In addition, I visited the
21 Sanmen site in China where the AP1000 units were under construction but
22 behind schedule. In 2010, I took the owner of the Barakah project in the

1 UAE to Sanmen to learn about the site infrastructure. Considering what I
 2 knew about the Project prior to being retained by SCE&G, there was
 3 nothing new or surprising about what I saw in reading the Bechtel Reports.

4 As shown in *Exhibit* ____, (*KP-2*), the issues and challenges
 5 confronted by this Project were clearly disclosed.

6 **Q. WAS THE BECHTEL REPORT CURRENT WHEN ISSUED?**

7 A. No. Bechtel issued its report in 2016 based on an analysis conducted
 8 in the late summer and fall of 2015. Bechtel formulated its conclusions
 9 before the October 2015 Amendment to the Engineering, Procurement &
 10 Construction Agreement (“EPC Contract”). The amendment:

- 11 • Scrapped the Consortium structure,
- 12 • Released CB&I from the Project,
- 13 • Allowed Fluor to be hired as construction contractor under WEC,
- 14 • Allowed for a fixed price guarantee for completing the EPC
- 15 Contract work,
- 16 • Increased liquidated damages and completion incentives,
- 17 • Limited future change orders, and
- 18 • Restructured other commercial terms of that Agreement.

19 As the Bechtel Reports indicate, many of the individual
 20 recommendations –by most counts a majority of them– were negated by
 21 these changes in the Consortium structure and other changes made by the

1 2015 EPC Amendment. This made the report largely outdated before it was
2 issued.

3 In addition, immediately after the 2015 EPC Amendment was
4 signed, Fluor began to conduct reviews and other initiatives to create new
5 staffing plans, streamline work packages, resolve engineering bottlenecks,
6 formulate mitigation plans, and revise the Project construction schedule. In
7 addition, a new project management oversight structure was imposed in late
8 2015, which negated yet another recommendation contained in the Bechtel
9 Report. Many of the recommendations of the Bechtel Report were in place
10 or in process before the report was issued.

11 For these reasons, the Bechtel Report was essentially outdated when
12 issued and became more outdated with each passing month.

13 **Q. HAVE YOU FORMED ANY OTHER OPINIONS REGARDING THE**
14 **BECHTEL REPORTS?**

15 A. Yes, based on my review I have reached two primary conclusions
16 regarding the Bechtel Reports. First, as stated above and in my Prior
17 Testimony, the Bechtel Reports do not contain material information that
18 was not previously known to SCE&G and disclosed to the ORS. Second,
19 the schedule estimate contained in the Bechtel Presentation, Draft Bechtel
20 Reports and Bechtel Assessment is derived from a limited access to the
21 Project and is unreliable. The decision not to include that schedule estimate
22 in the final version of the report and not to present the Bechtel Assessment

1 was entirely logical and supportable. In fact, it might have been imprudent
2 to provide Bechtel's unreliable substantial completion dates.

3 **Q. WAS BECHTEL RETAINED OR AUTHORIZED TO GENERATE**
4 **ITS OWN PROPOSED SCHEDULE FOR THE PROJECT?**

5 A. No. According to the scope of work for the Project, Bechtel was not
6 hired or authorized to generate a proposed schedule for the Project nor was
7 it given access to the information required to do so, as Bechtel itself admits
8 in the report.

9 **Q. IN WHAT WAYS WAS THE SCHEDULE INFORMATION IN THE**
10 **BECHTEL REPORTS FLAWED AND UNRELIABLE?**

11 A. Given the scope of work under which Bechtel was hired, and the
12 limitations under which it operated, Bechtel did not have sufficient
13 information to create an accurate schedule for completion of the Project.
14 Most importantly, as Bechtel freely admitted, it did not have access to the
15 Level 3 Schedule¹ for the Project. It was simply impossible for Bechtel to
16 accurately evaluate schedule and milestone delays and to revise and predict
17 future completion dates without access to a Level 3 Schedule for the
18 Project. In addition, design and procurement for both Westinghouse and
19 CB&I were being done on a functional basis from their respective home
20 offices for all the ongoing AP1000 projects, as compared to Bechtel's

¹ The Level 3 schedule spans the whole of a project and includes all major milestones, major elements of design, engineering, procurement, construction, testing, commissioning and/or start-up.

1 analysis of these issues only for the Project, making an outside schedule
2 review even more complex.

3 **Q. WERE YOU SURPRISED THAT BECHTEL WAS NOT GIVEN THE**
4 **KIND OF ACCESS TO DATA THAT IT WOULD HAVE NEEDED**
5 **TO COMPILE ITS OWN PROJECT SCHEDULE?**

6 A. No, not at all. There was no reason to give Bechtel the sort of access
7 to data required to create a new project schedule. Bechtel was never
8 authorized to create a new project schedule. In fact, there is no indication in
9 the documents that SCE&G was even aware that Bechtel was preparing an
10 alternative project schedule until one appeared in the presentation materials
11 at the end of Bechtel's work. Moreover, the schedule generated by Bechtel
12 simply confirmed what was already known by SCE&G and ORS - that the
13 Project was delayed and that significant mitigation of the issues plaguing
14 the Project was necessary. The schedule did not provide any new
15 information that would have been meaningful at the time the report was
16 issued.

17 **Q. WHAT SORT OF DATA ACCESS LIMITATIONS DID**
18 **WESTINGHOUSE AND CB&I IMPOSE ON BECHTEL AND WHY?**

19 A. Bechtel is a direct competitor of CB&I and Fluor and at the time
20 could be considered a potential competitor of Westinghouse in the areas of
21 project management and delivery. These companies were understandably
22 reluctant to provide Bechtel with data that Bechtel could use to compete

1 against them for future business. For that reason, WEC and CB&I required
2 Bechtel to review data in secure reading rooms and not copy that data into
3 Bechtel's systems and programs. These limitations did not prevent Bechtel
4 from conducting review and critique of the existing project schedule that it
5 was tasked to do. But apparently these limitations did prevent Bechtel from
6 exporting the data and information needed to compile its own project
7 schedule into its own computer systems, or for whatever reason, Bechtel
8 was never successful in doing so. This prevented Bechtel from using the
9 existing construction schedule and other site-specific data and information,
10 including information about mitigation plans, to create its own schedule.
11 As a result, the Bechtel schedule was more qualitative than quantitative.

12 **Q. DID THE UNAUTHORIZED NATURE OF THE BECHTEL**
13 **SCHEDULE LIMIT IT IN OTHER WAYS?**

14 A. Yes. Because the creation of this schedule was unauthorized,
15 Bechtel could not seek WEC/CB&I's help in incorporating into Bechtel's
16 scheduling software information about the specific mitigation efforts that
17 were underway, the evolution of the Project and its critical path, and the
18 effect of the experience curve on the future productivity and schedule
19 compliance. Going it alone as it did, Bechtel was required to create a
20 schedule based on generic information from other nuclear projects, general
21 productivity and staffing trends, and similar non-specific resources. For
22 that reason, the draft schedule included in the Bechtel Presentation and

1 Draft Bechtel Report was more qualitative than quantitative and
2 incomplete. The report itself indicates as much. The decision not to include
3 this schedule in the final report was entirely justified for those reasons.

4 **Q. WAS ANOTHER, BETTER INFORMED SCHEDULING EFFORT**
5 **UNDERWAY AT THE TIME THE BECHTEL REPORT WAS**
6 **ISSUED?**

7 A. Yes. At the time the Bechtel Report was issued in early 2016,
8 Westinghouse and Fluor had already worked together in late 2015 to create
9 a preliminary resource-loaded integrated project schedule that corresponded
10 to the new completion dates in the revised fixed-priced contract negotiated
11 by SCE&G and Santee Cooper. Subsequent to the Westinghouse
12 acquisition of Stone & Webster in January 2016, Fluor was engaged
13 through their contract with Westinghouse to work with Westinghouse to
14 perform a full Estimate-To-Complete, which included creating a new fully
15 resource loaded construction schedule based on access to all relevant data,
16 assessments, mitigation plans, and other information. This is another
17 reason why it made sense not to proceed publicly or otherwise with the
18 Bechtel schedule. In addition, SCE&G and Santee Cooper had negotiated a
19 revised fixed-priced contract with WEC in 2015 which was eventually
20 approved by the Commission in 2016 and which transferred substantial risk
21 to WEC in project completion costs and revised completion dates. These
22 dates were from WEC, the vendor who had all of the project information

1 and very importantly commercially took on these completion risks -
2 including substantial financial risk of liquidated damages - and dates which
3 were challenging. In other words, they put their money on their words.
4 This was an appropriate schedule to rely on. Not Bechtel's.

5 Also, SCE&G's approach was right in a project management sense.
6 The delayed Bechtel dates were factually unsupported. But acknowledging
7 them as reasonable would have taken pressure off of WEC and CB&I to
8 meet the existing and more challenging schedule commitments WEC and
9 CB&I had made. It would have removed the urgency around the existing
10 dates. This is not a theoretical issue. I have seen this happen before. Also
11 in my experience, projects in delay have recovered, most notably in
12 Qinshan, China where the units I led were about four months late at the
13 mid-point but recovered. It took a combined vendor-owner partnership
14 committed to the earlier dates to recover those delays and even resulted in
15 completion one month early. I also experienced the learning curve on the
16 Project which helped to bring the second unit into service some four
17 months early. My interactions with WEC and my discussions with SCE&G
18 personnel indicated a similar learning curve existed for the Project.

19 **Q. WHAT OTHER LIMITATIONS IMPAIRED BECHTEL'S ABILITY**
20 **TO ASSESS THE PROJECT?**

21 A. Several other circumstances hindered Bechtel's ability to prepare an
22 accurate schedule for the Project. Notably, Bechtel did not have any

1 experience with the new U.S. Nuclear Regulatory Commission (NRC)
2 regulatory standards which applied to the Project. The Project is subject to
3 Part 52 - LICENSES, CERTIFICATIONS, AND APPROVALS FOR
4 NUCLEAR POWER PLANTS of the NRC regulations ("Part 52"). To my
5 knowledge, Bechtel has never been a vendor or builder of a project subject
6 to Part 52 until it supplanted Fluor Corporation as the contractor for the
7 Vogtle project in late 2017. At the relevant time, therefore, Bechtel lacked
8 the institutional knowledge necessary to understand the value of prior Part
9 52 project lessons learned and to transform those lessons learned into
10 schedule efficiencies. Similarly, Bechtel did not account for SCE&G's
11 formal collaboration with the firms building AP1000 units in China and
12 SCE&G and the Consortium's ability to incorporate lessons learned from
13 AP1000 construction in China into the Project going forward. Each of
14 these circumstances hindered Bechtel's ability to assess the Project and its
15 ability to quantitatively predict a completion schedule for the Project.

16 **Q. WHY WOULD A COMPANY LIKE BECHTEL CREATE A**
17 **PROJECT SCHEDULE THAT THE CLIENT DID NOT REQUEST?**

18 **A.** It is well recognized in the nuclear construction industry that firms
19 like Bechtel have an economic reason to use one-off consulting
20 opportunities to develop new or expanded assignments of an ongoing
21 nature. There is nothing wrong with this practice, which is well recognized
22 in the industry. It is referred to as "leaving a trail of bread crumbs" and the

1 bread crumbs lead to more work for the consulting firm. People with
2 experience in the construction industry understand and expect that
3 consulting firms may do this. And sometimes when they do, they play up
4 negative findings to create a sense of urgency around the need to hire the
5 firm to fix the problems identified. Generally speaking, there is nothing
6 wrong with this, as long as it is recognized and the findings are not
7 misinterpreted. Reports produced in these circumstances need to be read
8 with this fact in mind.

9 **Q. YOU INDICATED EARLIER THAT YOU HAD AN OPINION**
10 **CONCERNING THE PRUDENCY OF SCE&G'S ACTIONS**
11 **RELATED TO THE PROJECT. CAN YOU SHARE THAT OPINION**
12 **WITH US?**

13 A. SCE&G's role in the Project was largely defined by the EPC
14 Contract which it entered into with the Westinghouse Consortium so that it
15 could access the AP1000 Advanced Passive Safety technology. The
16 AP1000 technology was clearly a good choice in light of Westinghouse's
17 experience and standing in the industry, and the technology of the AP1000
18 design itself. Another very important consideration was that SCE&G was
19 already operating a Westinghouse pressurized water reactor at the
20 Jenkinsville site and had been doing so safely and effectively for
21 approximately 30 years. For a number of reasons, it is best to have
22 comparable reactor designs on a given site.

1 I know the attractiveness of the AP1000 Advanced Passive Safety
2 design from direct experience in competing against it. My former company
3 AECL was a competitor of WEC in China. In the end, China chose
4 AP1000 technology over our design and over the existing, domestic
5 Chinese reactor design. I understood why the Chinese selected the WEC
6 AP1000 over the other designs. The AP1000 passive safety design is a
7 major advance in the technology and WEC was a very well respected
8 design firm.

9 As a practical matter, choosing the AP1000 technology for the
10 Project entailed choosing Westinghouse and its consortium partner to
11 construct the Units under an EPC Contract. Those were the terms on which
12 the technology was offered and bid. As is the case with all projects being
13 delivered under an EPC process, the EPC Contract defined SCE&G's role
14 as owner and set the limits within which SCE&G could effectively operate.

15 **Q. CAN YOU ADDRESS MR. JAMES' CONTENTION THAT**
16 **SCE&G'S "HANDS-OFF" APPROACH TO MANAGING THE**
17 **PROJECT WAS IMPRUDENT AND MR. JONES' CONTENTION**
18 **THAT SCE&G FAILED TO HOLD THE CONSORTIUM FULLY**
19 **ACCOUNTABLE FOR FAILURE TO MEET MILESTONES?**

20 **A.** Yes. As discussed in my Prior Testimony, the documents that I have
21 reviewed show that SCE&G set a tone and culture of openness and
22 communications in undertaking its role as owner of the Project. I fully

1 appreciate the value of this approach as it is the same model that helped my
2 success in China in completing two units ahead of schedule and under
3 budget. SCE&G's approach is quite clear in the documentary record. At
4 every stage of the Project, SCE&G appropriately and consistently focused
5 on finding constructive and practical resolutions to issues as they arose.

6 The documentary record also shows that SCE&G understood its role
7 as an owner operating under an EPC Contract. Its job was to demand
8 performance from the EPC contractors without directing the means or
9 methods used to accomplish the work, or usurping the role of the
10 contractors to manage the work. Under an EPC Contract, the choice of
11 means and methods are exclusively the contractors' responsibility. And that
12 was spelled out in the EPC Contract. When owners seek to dictate means
13 and methods, the contractor can treat all owners' directives as change
14 orders and this can dramatically increase the cost of the project and lead to
15 conflict and disputes. SCE&G's actions show that it understood the line
16 between demanding performance and directing means and methods.
17 SCE&G exercised its authority as owner appropriately and effectively.

18 In addition and much more than the "hands-off" approach described
19 by Mr. James, SCE&G wisely adopted a graded approach to oversight of
20 the Project. By that I mean that SCE&G calibrated its level of oversight and
21 resources committed on an area-by-area basis to reflect the seriousness of
22 the problems in each area of the Project and risks those problems posed.

1 SCE&G identified in a timely and effective way the areas where problems
2 were emerging that posed a threat to the Project and its schedule. And then
3 SCE&G focused its efforts and attention on those areas and enhanced its
4 oversight and commitment of resources to match the difficulty of the
5 problems and the potential consequences if they were not corrected as they
6 developed. I would also note that SCE&G disclosed those focus areas in its
7 quarterly reports in a timely fashion as they emerged. I successfully used
8 the same graded approach in my oversight role over the Korean APR 1400
9 units under construction in Barakah, UAE.

10 The documentary record also shows that SCE&G understood the
11 danger of an owner overplaying its role related to commercial issues.
12 SCE&G quite properly identified its challenge to be that of vigorously
13 enforcing its rights under the EPC Contract while not destroying the
14 working relationships necessary to successfully complete a project of this
15 scope. SCE&G took constructive action at multiple stages of the Project to
16 resolve and mitigate the destructive effects of commercial disputes.
17 SCE&G actively worked to avoid a confrontational culture with the
18 Consortium and to promote efficient and effective problem solving as long
19 as it was possible to do so. Mr. Jones fails to recognize that adopting a
20 confrontational culture early in the Project most certainly would have
21 resulted in higher costs and longer delays, and he is simply incorrect when
22 he asserts that applying more pressure on the Consortium would have

1 achieved improvements in production rates and productivity levels for the
2 Project.

3 Mr. Jones also fails to acknowledge that SCE&G's approach did
4 push commercial issues hard when it saw no other alternative for
5 motivating the Consortium to solve problems that threatened the successful
6 completion of the Units. I would specifically note SCE&G's actions taken
7 in 2014 and 2015 to place commercial pressure on the Consortium by
8 disputing or refusing to pay millions of dollars of invoices that it asserted
9 were the result of delay, poor productivity or inefficiency. In taking this
10 action, SCE&G took a calculated risk. Its actions could have caused a
11 breakdown of the Project and very nearly did. The Consortium threatened
12 in writing to walk off the job in response. CB&I left the Consortium, which
13 was in the end a benefit. But in light of the seriousness of circumstances,
14 taking such risks was justified at that time.

15 As discussed in my Prior Testimony, it has been my experience, over
16 many such projects, that the approach SCE&G took as owner was the most
17 prudent and constructive approach available to an owner under the EPC
18 Contract. It is my opinion that SCE&G discharged its functions as an owner
19 with great insight and care.

20 **Q. MR. RUBIN CONTENDS THAT SCE&G SHOULD HAVE**
21 **ABANDONED THE PROJECT IN 2013 OR NO LATER THAN MID-**
22 **2014. DO YOU AGREE WITH THAT ASSESSMENT?**

1 A. No, I do not. SCE&G made prudent decisions when it selected the
2 AP1000 technology and selected WEC to build the AP1000. This
3 technology is sound and could have been completed as evidenced by
4 completion of the reference AP1000 units in China. The international new-
5 build AP1000 program is moving ahead. AP1000 units at Sanmen and
6 Haiyan in China are now in service and added AP1000 units are being
7 actively considered in China indicating that the Chinese are satisfied with
8 final performance and output. The Project and companion AP1000 Vogtle
9 project were premised on following the Chinese lead and program which
10 has struggled but is now actively moving ahead. China has shown that
11 completion of the AP1000 is achievable. Others have testified regarding the
12 economic decisions leading to abandonment of the Project and that is not
13 my area of expertise, but I am an expert on completing nuclear projects and
14 on the success of the AP1000 technology and I would not have
15 recommended abandonment in 2013 or 2014.

16 **Q. ARE YOU FAMILIAR WITH THE NEW STANDARD FOR**
17 **PRUDENCY IN SOUTH CAROLINA REQUIRED BY ACT 258?**

18 A. Not entirely, and I am not a lawyer, but I understand that the
19 legislation allows for an owner, such as SCE&G, to be held responsible for
20 the imprudent actions of contractors, subcontractors or vendors even if
21 those are not contractually assigned to the owner.

1 **Q. IN YOUR EXPERIENCE ARE THOSE REQUIREMENTS TYPICAL**
2 **OF INDUSTRY STANDRDS?**

3 A. Absolutely not. I've never seen a situation where an owner is
4 accountable in this way. It makes no sense. Construction of nuclear
5 construction projects would cease if this were the norm. The South
6 Carolina legislation transfers all project risk from the vendor / contractors
7 to the owners. No reasonable owner would take on a project if it must
8 assume all the risk for the project. The risk structure created by this
9 legislation is a fiction and cannot work in the real world. I've never seen a
10 project that operates under such a structure.

11 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

12 A. Yes, it does.